IN THE CLAIMS:

The following listing of claims will replace all prior versions, and listings, of the claims in the application:

1-21. (Canceled)

22. (Currently amended) A method of characterizing vascular tissue, comprising;

collecting RF backscatter data from a portion of a vascular object;

using at least said RF backscatter data to construct a first image of said portion of said vascular object;

preparing a histology of said portion of said vascular object;

using said histology to construct a second image of said portion of said vascular object;

characterizing at least a portion of said histology;

identifying a region of interest (ROI) of said second image, said ROI corresponding to said at least a portion of said histology;

identifying at least one landmark common to said first and second images and using said at least one landmark to identify a region of said first image that substantially corresponds to said ROI of said second image, said step of identifying at least one ~~further~~ landmark further comprising applying a morphometric algorithm to align the at least one landmark of said second image to substantially match the at least one landmark of said first image;

identifying a portion of said RF backscatter data corresponding to said region of said first image;

identifying at least one parameter of said RF backscatter data; and

storing said at least one parameter and said characterization of said at least a portion of said histology.

23. (Original) The method of Claim 22, wherein said step of identifying at least one parameter further comprises performing a frequency transformation on said portion of said RF backscatter data before said at least one parameter is identified.

24. (Original) The method of Claim 22, wherein said step of identifying at least one parameter further comprises performing a wavelet transformation on said portion of said RF backscatter data before said at least one parameter is identified.

25. (Canceled).

26. (Previously presented) The method of Claim 22, wherein said step of identifying at least one landmark further comprises aligning the non-landmark portions of said first and second images based on a thin plate algorithm.

27. (Original) The method of Claim 22, wherein said step of characterizing at least a portion of said histology further comprises identifying a tissue type, said tissue type being selected from a group consisting of fibrous tissues, fibro-lipidic tissues, calcified necrotic tissues, and calcific tissues.

28. (Original) The method of Claim 23, wherein said step of performing a frequency transformation further comprises using a fast Fourier transform (FFT).

29. (Original) The method of Claim 23, wherein said step of performing a frequency transformation further comprises using the Welch periodogram

30. (Original) The method of Claim 23, wherein said step of performing a frequency transformation further comprises using autoregressive power spectrum (AR) analysis.

31.   (Original) The method of Claim 22, wherein said step of identifying at least one parameter further comprises identifying said at least one parameter from a group consisting of maximum power, minimum power, frequency at maximum power, frequency at minimum power, y intercept, slope, mid-band fit, and integrated backscatter.

32.   (Original) The method of Claim 22, further comprising:

collecting a second set of RF backscatter data from a second vascular object;

performing a frequency transformation on at least a portion of said second set of RF backscatter data to produce a third set of data;

identifying at least another parameter from a third set of data; and

using said at least another parameter, said at least one parameter and said characterization of said at least a portion of said histology to characterize at least a portion of said second vascular object.

33.   (Previously presented)   A   vascular-tissue-characterization   system, comprising:

a computing device comprising:

a database; and

a characterization application electrically connected to said database and adapted to:

receive intra-vascular ultrasound (IVUS) data corresponding to a portion of a vascular object and digitized data corresponding to a histology of said portion of said vascular object;

use at least said IVUS data and said digitized data to construct a first and second image, respectively, of said portion of said vascular object;

receive characterization data corresponding to a region of interest (ROI) of said second image;

use at least one landmark to morph said second image to substantially match said first image and to identify said ROI on said first image;

identify a portion of said IVUS data corresponding to said ROI on said first image;

identify at least one parameter related to said portion of said IVUS data; and

store said at least one parameter and said characterization data in said database, said characterization application being further adapted to use a morphometric algorithm to align the at least one landmark of said second image to substantially match the at least one landmark of said first image.

34.   (Original) The vascular-tissue-characterization system of Claim 33, wherein said characterization application is further adapted to perform a spectral analysis on said IVUS data before said at least one parameter is identified.

35.   (Original) The vascular-tissue-characterization system of Claim 34, wherein said characterization application is further adapted to perform a fast Fourier transform (FFT).

36.   (Original) The vascular-tissue-characterization system of Claim 34, wherein said characterization application is further adapted to perform the Welch periodogram.

37.   (Original) The vascular-tissue-characterization system of Claim 35, wherein said characterization application is further adapted to perform autoregressive power spectrum (AR) analysis.

38.   (Original) The vascular-tissue-characterization system of Claim 33, wherein said at least one parameters is selected from a group consisting of maximum power, minimum power, frequency at maximum power, frequency at minimum power, y intercept, slope, mid-band fit, and integrated backscatter.

39.   (Original) The vascular-tissue-characterization system of Claim 33, wherein said characterization data comprises a tissue type, said tissue type being selected from a group consisting of fibrous tissues, fibro-lipidic tissues, calcified necrotic tissues, and calcific tissues.

40. (Original) The vascular-tissue-characterization system of Claim 34, wherein said characterization application is further adapted to analyze said IVUS data to identify at least one location corresponding to said at least one parameter.

41. (Original) The vascular-tissue-characterization system of Claim 33, further comprising an input device electrically connected to said computing device, said characterization data being provided by said input device.

42. (Original) The vascular-tissue-characterization system of Claim 33, further comprising an IVUS console adapted to:
  acquire said IVUS data from said vascular object; and
  provide said IVUS data to said computing device.

43. (Original) The vascular-tissue-characterization system of Claim 42, further comprising an IVUS catheter having at least one transducer, said IVUS catheter being electrically connected to said IVUS console and adapted to acquire said IVUS data from said vascular object.

44. (Canceled).

45. (Previously presented) The vascular-tissue-characterization system of Claim 33, wherein said characterization application is further adapted to align the non-landmark portions of said first and second images based on a thin plate algorithm.